

TABLE 3.—Maximum free-air wind velocities (m. p. s.), for different sections of the United States, based on pilot-balloon observations during February 1941

Section	Surface to 2,500 meters (m. s. l.)					Between 2,500 and 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast <sup>1</sup>	35.8	WSW	1,810	12	Binghamton, N. Y.	52.8	SSW	4,700	8	Portland, Maine	69.2	WSW	10,190	12	Caribou, Maine.
East-Central <sup>2</sup>	44.2	WNW	2,050	17	Louisville, Ky.	68.0	WNW	3,520	18	Norfolk, Va.	84.0	W	9,000	15	Greensboro, N. C.
Southeast <sup>3</sup>	37.7	NW	2,320	18	Spartanburg, S. C.	46.2	WNW	4,700	15	Atlanta, Ga.	70.0	WNW	10,150	23	Atlanta, Ga.
North-Central <sup>4</sup>	40.2	NW	930	14	Bismarck, N. Dak.	46.4	NW	5,000	18	Minneapolis, Minn.	64.4	WNW	5,940	18	Madison, Wis.
Central <sup>5</sup>	42.7	NW	2,260	17	Moline, Ill.	56.0	WNW	5,000	18	Chicago, Ill.	67.5	WNW	9,730	17	Omaha, Nebr.
South-Central <sup>6</sup>	42.5	W	2,490	12	Big Spring, Tex.	50.8	WNW	4,310	12	San Antonio, Tex.	82.0	NNW	11,030	11	Houston, Tex.
Northwest <sup>7</sup>	30.0	S	2,480	5	Medford, Oreg.	33.0	WSW	5,000	26	Spokane, Wash.	59.0	W	18,200	1	Billings, Mont.
West-Central <sup>8</sup>	47.6	S	2,324	28	Ely, Nev.	55.5	SSW	4,340	28	Ely, Nev.	79.2	NW	9,920	9	Pueblo, Colo.
Southwest <sup>9</sup>	45.4	W	1,909	12	Roswell, N. Mex.	80.0	WNW	5,000	12	Winslow, Ariz.	91.6	NNW	9,820	9	Albuquerque, N. Mex.

<sup>1</sup> Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and northern Ohio.

<sup>2</sup> Delaware, Maryland, Virginia, West Virginia, southern Ohio, Kentucky, eastern Tennessee, and North Carolina.

<sup>3</sup> South Carolina, Georgia, Florida, and Alabama.

<sup>4</sup> Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.

<sup>5</sup> Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.

<sup>6</sup> Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except extreme west Texas), and western Tennessee.

<sup>7</sup> Montana, Idaho, Washington, and Oregon.

<sup>8</sup> Wyoming, Colorado, Utah, northern Nevada, and northern California.

<sup>9</sup> Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

## WEATHER ON THE NORTH ATLANTIC OCEAN

By H. C. HUNTER

**Atmospheric pressure.**—The average pressure during February 1941 over those portions of the North Atlantic that are amply covered by reports at hand was everywhere less than normal, though over the northern and eastern Gulf of Mexico the departure was small. Near the coast of the Maritime Provinces and New England the departure was especially large,  $-7.8$  millibars ( $-0.23$  inch). For most parts of the ocean it is indicated that pressure averaged lower during the second than during the first half of the month.

The extremes of pressure in the available vessel reports were 1,034.5 and 960.4 millibars (30.55 and 28.36 inches, respectively). The high mark was noted late on the 3d, near  $38^{\circ}$  N.,  $24\frac{1}{2}^{\circ}$  W., on the Portuguese S. S. *San Miguel*. The low mark was recorded on the American liner *Siboney*, about 10 a. m. of the 15th, when the vessel was slightly more than 200 miles west of Lisbon. In the western portion of the North Atlantic the lowest reading was noted by the United States Coast Guard cutter *Pontchartrain*, near  $40^{\circ}$  N.,  $58^{\circ}$  W., early on the 24th, 970.2 millibars (28.65 inches).

TABLE 1.—Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, February 1941

Station	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	Millibars	Millibars		Millibars	
Lisbon, Portugal	1,016.2	-3.1	1,029	7	990	15
Horta, Azores	1,016.8	-4.2	1,032	1,3	996	26
Belle Isle, Newfoundland	1,000.1	-6.0	1,019	13, 14	970	19
Halifax, Nova Scotia	1,005.1	-7.8	1,031	13	984	16
Nantucket	1,009.5	-7.8	1,028	13	981	7
Hatteras	1,013.9	-5.7	1,025	24	991	7
Turks Island	1,015.4	-3.2	1,018	1, 19	1,010	12
Key West	1,015.6	-2.7	1,022	10	1,001	9
New Orleans	1,018.0	-1.0	1,027	4	1,004	6

NOTE.—All data based on a. m. observations only, with departures compiled from best available normals related to time of observation, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

**Cyclones and gales.**—Those portions of the North Atlantic which are covered by reports at hand seem to have been about as turbulent, on the whole, as during an average February. The second half was stormier than

the first half, but during the 21st to 23d, as during a similar period, 11th to 13th, the ocean regions from which information has come seem to have been free from notable storms.

An important cyclonic system affected the western part of the ocean during the first week. It lay approximately along the Appalachian crest, extending over nearly the entire width of the United States, on the morning of the 2d, but was not then of much energy, nor did it intensify greatly during the first hours that it was moving eastward over Atlantic waters. By the morning of the 4th, however, when it was less extended, it showed considerable strength round its chief center, about 500 miles east of Nantucket, and the following morning's reports indicated a vigorous storm centered near Newfoundland, where it moved but slightly for 24 hours, then continued its northeastward advance. The Coast Guard cutter *Chelan*, near  $40^{\circ}$  N.,  $59^{\circ}$  W., on the 4th recorded a wind force of 12 in connection with this storm.

A low that was more severely felt close to the eastern coast of the United States than the one just described was centered over the Carolinas on the morning of the 14th, then moved to a short distance east of Hatteras the next evening; to about  $38^{\circ}$  N.,  $67^{\circ}$  W., on the morning of the 15th; and to a location not far to southeast of Nova Scotia on the evening of that day. Through the 16th and part of the 17th it was near southwestern Newfoundland, after which it united with a low which had followed it, and remained near the Gulf of St. Lawrence for several days, finally moving on to northeastward on the 23d. No information at hand indicates force-12 winds connected with this storm, but the American liner *Excambion* met a force-11 gale when between Bermuda and New York, near  $33^{\circ}$  N.,  $65^{\circ}$  W., while two cutters considerably farther to eastward likewise reported winds of force 11.

During the final week of February a storm developed east of the South Atlantic States, showing moderate strength on the 23d when centered between the Carolinas and Bermuda, and on the following morning being remarkably vigorous when located about 600 miles to eastward of Nantucket. Thereafter it continued to move northeastward till lost to observation beyond southern Newfoundland. The cutters *Cayuga* and *Pontchartrain* reported force 12 and the cutter *Bibb* force 11, while under the influence of this low.

John L. Ford of the Weather Bureau, in charge of the meteorological detail on the *Pontchartrain*, has supplied an account of that vessel's meeting this storm, near 40° N., 58° W., as the cutter headed for New York. The following is extracted from his account:

Highest winds were estimated at 130 to 150 miles per hour. The pressure reached the lowest point, 28.65 inches (970.2 millibars), about 2:20 a. m., February 24. Winds of force 8 or greater covered the entire period from that time to 10 a. m. the 25th.

During the three hours preceding the passage of the cold front the winds were mostly from south-southeast, force 2 to 5, skies somewhat variable with rain showers and frequent distant lightning.

At 2:15 a. m. the wind shifted from south-southeast, 4, to northwest, with gusts of 7, for about one minute, then dropped to west, 4. At 2:20 the wind shifted back to northwest with force from 10 to 12, but seldom less than 11. With this shift in wind heavy rain showers occurred, with severe lightning in the distant southwest. Soon sheets of spray were being carried through the air, making it impossible to see far. The wind continued at velocities over 100 miles per hour until about 5 a. m. At 6:10 a. m. the wind was north-northwest, 70 miles per hour. (The lower limit of force 12 is 75 miles per hour.) It was then light enough to make out a ragged strato-cumulus layer at 150 to 200 feet above the surface. Long heavy swells at the rate of 8 per minute were observed.

During the last days of February and the early days of March another strong storm caused high winds over parts of the western Atlantic. From the Gulf of Mexico, where this storm had shown comparatively little strength on the 25th and 26th, the center moved across Florida during the night of the 26-27th. It was not far to the eastward of Norfolk on the morning of the 28th, and to south-eastward of Nantucket at the evening observation. One vessel reported force 11 wind as met about 170 miles to east-southeastward of Norfolk during the 28th.

Some information has been received of the great violence of a storm about the middle of the month over Spain, Portugal, and the waters adjacent to them. As early as the forenoon of the 13th pressure was quite low

between the Azores and the Bay of Biscay. This storm center moved eastward and was close to the northwest corner of the Iberian peninsula during the night of the 14-15th, and in about the same position during much of the 15th.

Press dispatches indicate that ships at Lisbon in the Tagus River were injured and some small boats sunk, while 60 persons were sent to hospitals there, due to the storm's havoc. In Spain and Portugal altogether at least 102 persons died, while the damage reached millions of dollars, many crops and valuable trees being ruined. It was considered the worst storm for Portugal since 1848. Though northern Spain apparently felt more severe winds than the southern part of the peninsula, yet even at Gibraltar a freighter broke its moorings and was driven upon the beach.

Three instances of hurricane-force winds (12), noted by Coast Guard cutters over western North Atlantic waters, have already been mentioned. February's fourth instance was connected with this eastern waters storm, the American liner *Siboney* encountering such force during the 15th to westward of Portugal.

*Fog.*—The available information implies that there was less fog than had occurred during the preceding January; also in those areas where during late winter fog is usually met most frequently the reports indicate somewhat less than February normally brings.

Near the eastern coast of the United States, from Maine to the Carolinas, the fog reports all fall within the period from 7th to 15th inclusive. Two 5° squares of this stretch of coast, about in the latitude of Chesapeake Bay, furnished reports on 3 days each, exceeding all other North Atlantic squares.

Apart from this coastal strip the observations of fog were widely scattered geographically, while in point of time they were well distributed through the month.

## OCEAN GALES AND STORMS, FEBRUARY 1941

Vessel	Voyage		Position at time of lowest barometer		Gale began, February	Time of lowest barometer, February	Gale ended, February	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
North Atlantic Ocean													
Chelan, U. S. C. G.	On Station No.1		39 45 N.	59 00 W.	3	1p, 4	5	989.2	SSW	SW, 12	W	SW, 12	S-WSW.
Shenandoah, Am. S. S.	Norfolk	Port Arthur	28 18 N.	79 12 W.	6	7a, 7	7	1,001.7	S	SW, 8	SW	SW, 8	S-W.
Republic, U. S. A. T.	New York	Cristobal	36 02 N.	73 56 W.	7	1p, 7	7	989.5	SSE	SSW, 7	W	SSE, 10	SSE-SW.
Panama, Am. S. S.	do.	Port au Prince	36 00 N.	74 06 W.	7	2p, 7	7	987.5	SSE	S, 8	NW	S, 9	SSE-NW.
City of Omaha, Am. S. S.	Capetown	Savannah	30 54 N.	78 20 W.	6	2p, 7	7	995.3	SE	SW, 8	NNW	W, 8	SW-NW.
A vessel	New York	Puerto Sucre	33 44 N.	71 00 W.	7	5p, 7	7	995.3	S	S, 9	SW	S, 9	S-SW.
Coamo, Am. S. S.	do.	San Juan	34 48 N.	71 45 W.	7	6p, 7	8	988.8	SSE	SSW, 7	W	SSE, 10	SSE-W.
William G. Warden, Am. S. S.	Baton Rouge	Boston	41 42 N.	69 18 W.	7	2a, 8	8	983.7	SE	SW, 5	WSW	E, 9	SE-WSW.
Chelan, U. S. C. G.	Bermuda	Station No. 1	35 36 N.	64 06 W.	7	2p, 8	8	1,004.7	SSE	SW, 5	SW	S, 10	NE-S-WSW.
Hibueras, Am. S. S.	Puerto Barrios	New Orleans	22 15 N.	86 19 W.	8	8p, 8	9	1,004.7	WSW	S, 3	NNW	NNW, 8	NE-S-WSW.
R. W. Gallagher, Am. S. S.	Boston	Houston	25 06 N.	85 42 W.	8	11p, 8	9	1,003.7	NW	NW, 9	NNW	NW, 9	NW-NNW.
Pontchartrain, U. S. C. G.	On Station No.2		39 42 N.	45 12 W.	9	2p, 10	10	1,009.1	SSW	SW, 9	NW	W, 10	SW-W.
Do.	do.												
Nebraska, Am. S. S.	New York	Cristobal	38 42 N.	46 00 W.	13	4p, 13	14	1,006.4	NNE	E, 6	NE	NE, 9	NE-E.
Tennessee, Am. S. S.	Providence	Port Arthur	32 42 N.	74 54 W.	14	2p, 14	15	1,001.7	S	WSW, 8	NW	WSW, 8	S-W.
Siboney, Am. S. S.	Lisbon	San Miguel, Azores	38 42 N.	72 43 W.	15	4a, 15	15	999.0	NNW	NNE, 5	NW	NNW, 9	NE-NNW.
			38 28 N.	12 59 W.	15	10a, 15	17	960.4	S	WSW, 10	WSW	NW, 12	S-WSW-N.
Excambion, Am. S. S.	Bermuda	New York	32 56 N.	64 58 W.	15	4p, 15	17	1,000.7	WSW	WSW, 9	NW	WNW, 11	WSW-NNW.
Chelan, U. S. C. G.	On Station No.1		38 28 N.	59 00 W.	14	12m, 16	17	992.9	SSE	WSW, 8	W	W, 11	WSW-W.
Pontchartrain, U. S. C. G.	On Station No.2		38 54 N.	45 54 W.	16	6a, 17	17	999.7	W	WSW, 7	WSW	SW, 8	SW-WSW.
R. W. Gallagher, Am. S. S.	Galveston	New York	34 18 N.	75 30 W.	17	1p, 17	18	998.6	WSW	W, 7	NW	NW, 9	WSW-NNW.
Chateau-Thierry, U. S. A. T.	San Juan	Boston	35 00 N.	68 12 W.	17	7p, 17	19	989.2	WSW	WNW, 9	WNW	WNW, 9	WSW-NNW.
Monroe, Am. S. S.	New York	San Juan	33 18 N.	70 54 W.	17	7p, 17	18	998.0	SW	SW, 9	WNW	SW, 9	SW-NW.
Chelan, U. S. C. G.	On Station No.1		38 38 N.	59 10 W.	18	4a, 18	19	983.1	S	SW, 9	W	W, 11	S-SW.
Pontchartrain, U. S. C. G.	On Station No.2		39 06 N.	45 30 W.	18	8p, 18	19	1,004.7	SSW	S, 11	SW	S, 11	S-SW.
Chelan, U. S. C. G.	On Station No.1		38 18 N.	60 00 W.	20	2p, 20	21	999.0	W	W, 8	W	W, 10	None.
Bibb, U. S. C. G.	Norfolk	Station No. 2	38 30 N.	54 54 W.	20	2a, 21	20	998.6	WNW	WSW, 7	WNW	WNW, 9	W-SW.
Cayuga, U. S. C. G.	On Station No.1		39 00 N.	50 18 W.	24	1a, 24	25	972.9	SSW	SSW, 5	W	NW, 12	SSW-NW.
Pontchartrain, U. S. C. G.	Station No. 2	New York	39 42 N.	58 18 W.	24	2a, 24	25	970.2	SSE	NW, 12	NW	NW, 12	SSE-NW.

See footnotes at end of table.